"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

system of intersecting slip lines is formed. Increasing the degree of deformation of molybdenum at 240 to 700°K brings about the appearance of new slip bands and an increase in the displacement along the slip planes. The development of the process of deformation, however, is manifested predominantly by growth of the initially-formed slip bands. Thus, for example, just before the fracture of a specimen ($\delta = 38\%$) at 700°K, the slip bands may become 6 to 7 μ wide. The density of the slip lines also changes with temperature. At 700°K, it is relatively small and slip bands, spaced at 12 to 15 μ, predominate. At 300°K, the density of slip bands corresponding to the same degrees of deformation is higher, the width of the slip bands and the spacing between them decreasing. With a further decrease in temperature, the density of slip bands again decreases approaching that obtaining at 700°K.
(2) In addition to deformation by slip (as revealed by the formation of slip bands) plastic deformation of molybdenum at room temperature entails a specific mode of deformation, localized at the grain boundaries and in the grain-boundary regions. This mechanism operates at relatively low strains (3 to 5%). With increasing strain some of the regions of localized deformation grow

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

in size and cracks are formed at the boundaries of these regions after heavy deformation. The width of these near-boundary regions can reach 25 to 30 μ, the relative displacement of adjacent grains along the grain-boundary being several tenths of a μ. This mode of plastic deformation which has been observed in pure iron at sufficiently low temperatures (Ref.4: Gindin I.A. and Starodubov Ya.D. FTT, 1959, 1, 1794) appears to be a property of pure metals. The microstructure and interference pattern of the grain-boundary and the grain-boundary region of molybdenum, deformed at 300°K to $\delta = 20\%$, is shown in Fig.5a and 5b respectively (magnified 440-fold). (3) With decreasing temperature the character of plastic deformation changes considerably. At temperatures approaching the ductile-to-brittle transition, fragmentation and block formation precede the appearance of slip bands. The formation of blocks (whose size, determined with the aid of an electron microscope, was found to be $(2 - 3) \times 10^{-4}$ cm) increases the resistance of molybdenum to slip and twinning; the process of deformation becomes less uniform and fracture takes place at relatively small strains. (4) In contrast to other metals with

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

body-centred cubic crystal structure, twinning plays a relatively insignificant part in the plastic deformation of molybdenum. Thin twins (1 to 2 μ thick) appear in specimens deformed below 246°K but only in isolated grains. An electron microphotograph (magnified 11250 times) of a twin (approx 0.5 μ thick) in molybdenum deformed at 200°K to δ = 2% is shown in Fig.8. A specific characteristic of twins of this type is the presence of lightly and heavily distorted zones showing, respectively, as dark and light bands on the microphotograph. It is postulated that the highly distorted zone is formed suddenly when a certain stress, required to initiate the process of twinning, is reached. The appearance of this zone is accompanied by the formation of a mosaic structure in the boundary region and by the formation of blocks and their elastic recovery. As in the case of iron, growth of a twin in molybdenum takes place by movement of one of its boundaries; on reaching the distorted region, the growth of the twin ceases owing to the strain-hardening of this zone. (5) The specific character of plastic deformation of molybdenum is reflected in the manner in which this metal fractures. At 300 and 700°K fracture takes place along the slip planes and a well-defined neck is formed

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

in a tensile test piece. Cracks along the slip planes appear also in molybdenum, tested at 240°K, but in this case they are accompanied by cracks along the cleavage planes, the number of these cracks increasing with decreasing temperature. This is illustrated in Fig.9 (magnified 440-fold) showing a portion of a test piece deformed at 243°K to $\delta = 18\%$ in which the parallel slip lines end at a crack along the cleavage plane. On approaching the ductile-to-brittle transition temperature, and particularly below it, cracks along the grain- and block-boundaries are formed. Side by side with the main crack a number of cracks parallel to it but not traversing the entire cross-section of the test piece can be observed. Fracture below the critical temperature is both trans- and inter-crystalline, although the latter is relatively less pronounced. The decrease in strength of molybdenum below 27°K has been attributed to the formation of a large number of surface cracks which cause premature fracture. The formation of the surface cracks is, in turn, associated with a high concentration of oxygen in the surface layer. It was concluded from the results of the present investigation that the character of plastic deformation of 99.95% molybdenum in the temperature interval

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

studied changes considerably with decreasing temperature. In the plastic range deformation trans-crystalline slip predominates; at room temperature this mode of deformation is accompanied by localized deformation in the grain-boundary regions. On approaching the ductile-to-brittle transition temperature, block formation plays an increasingly important part and is mainly responsible for the absence of twinning at low temperature. Ductile fracture at 240 to 700°K takes place along the slip planes. At lower temperatures, cohesion of the metal is destroyed in the early stages of the deformation and the main crack develops along the block boundaries. There are 10 figures and 9 references: 5 Soviet and 4 non-Soviet. The four references to English language publications read as follows: Chen N.K., Maddin R. Trans. AIMME, 1951, 191, 461; Andrade E.N., Chow J.S. Proc.Roy. Soc., 1940, 175A, 290; Cahn R.W. J.Inst. Metals, 1954-55, 83, 493; Rendall J.H., Johnstone S.T.M., Carrington W.E. J.Inst.Metals, 1953-54, 82, 345.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN UkrSSR
(Physicotechnical Institute AS UkrSSR)

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

30456

18.9500

S/126/61/012/003/016/021
E193/E135

AUTHORS: Garber, R.I., Gindin, I.A., and Shubin, Yu.V.

TITLE: Tensile tests on beryllium single crystals in the 20-500 °C temperature range. V.

PERIODICAL: Fizika metallov i metallovedeniye, vol.12, no.3, 1961, 437-446

TEXT: Scarcity of data on the behaviour of beryllium single crystals under tensile stresses prompted the present authors to undertake the study of this subject. The experimental specimens were prepared from 99.98% pure Be by a pulling-out technique. The orientation of the single crystal tensile test pieces is shown in Fig.1, where p indicates the direction of the applied stress. A strain rate of 0.005%/sec was used in the tensile tests carried out at 20, 200, 400 and 500 °C, helium being employed as the protective atmosphere at elevated temperatures. The mechanical tests were supplemented by metallographic examination. The results of the mechanical tests are reproduced graphically. In Fig.2, the UTS and the yield point (p_b and p_s, kg/mm^2, left-hand scale)

Card 1/ 6

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

and elongation and reduction of area (δ and ψ, %, right-hand scale) are plotted against the test temperature (°C). The fifth curve shows the temperature-dependence of the so-called "diffusion deformation" factor, χ, which is given by $\chi = (1 - \varphi)\ 100$ °C, where φ denotes the deformation localised in the slip on the basal plane, its magnitude being calculated from

$$\varphi = \frac{\sum\limits_{i} n_i a_{si}}{(\Delta \ell)_s}$$

where n_i is the number of basal slip bands with the absolute slip displacement of a_{si}, and $(\Delta \ell)_s = \Delta \ell \cos 45°$ represents the strain of the specimen in the direction of slip. Fig.2 shows the true tensile stress/elongation curve for beryllium single crystals at temperatures indicated by each curve. The effect of temperature on the mode of slip is illustrated in Fig.4, showing (X 200) slip lines on the faces of specimens extended (from left to right) at 20, 200 and 400 °C. The variation of the mode of slip with rising temperature was also studied by determining the magnitude of the

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

30456

Tensile tests on beryllium single S/126/61/012/003/016/021
E193/E135

relative slip, γ, and density of the slip bands, ρ, these two parameters being given by $\gamma = b/a_s$ and $\rho = 1/h$ (for the meaning of b/a_s and h see Fig.1). In the regions of uniformly distributed slip lines, γ increased from 0.4 at 20 °C to 2.0 at 500 °C; in the region of macroscopically localised slip, at 400 °C, γ reached 70. The parameter ρ also initially increased with temperature, reaching a maximum of 0.12 $1/\mu$ at 200 °C after which it decreased again, reaching at 400-500 °C a value similar to that at room temperature (~ 0.3 $1/\mu$). Analysis of the results of mechanical tests, correlated with the examination of slip bands and microstructure of specimens after fracture, led to the following conclusions. 1) Plasticity of Be single crystals increases monotonically with rising temperature, showing no peak at 400 °C which is a characteristic of polycrystalline beryllium. The increase in plasticity in the 20-200 °C range is caused by the formation of new slip bands with the material within the bands hardening at a sufficiently fast rate. The increase in plasticity at higher temperatures is associated with the onset of localised slip, characterised by a

Card 3/ 6

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

30456

large magnitude of γ (about 70). Both UTS and the so-called strain-hardening modulus $\bar{D}$ passed through a maximum at 200 °C; $\bar{D}$ is given by $\bar{D} = (p_u - p_s)\delta$, where p_u is the true UTS of the metal. This effect is a manifestation of the simultaneously occurring processes of strain-hardening and relaxation.
2) Deformation of Be single crystals with an orientation as illustrated in Fig.1 takes place mainly by slip along the basal planes (0001) in the $[11\bar{2}0]$ direction. At higher temperatures, prismatic slip along the $\{101X\}$ plane in the general $[11\bar{2}0]$ direction and diffusion deformation play an increasingly important part. 3) Brittleness of Be single crystals at room temperature is caused by non-uniform plastic deformation along the basal plane which causes the formation and growth of cracks along the main cleavage plane. At high temperatures, slip becomes more uniform and deformation takes place partly by prismatic slip.
There are 10 figures, 1 table and 1 Soviet-bloc reference.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN USSR (Physicotechnical Institute, AS Ukr.SSR)

SUBMITTED: January 2, 1961

Card 4/6

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

S/126/61/012/006/007/023
E193/E383

AUTHORS: Gindin, I.A., Lazarev, B.G., Starodubov, Ya.D. and Lazareva, M.B.

TITLE: Mechanical properties of sodium in the range of low-temperature polymorphic transformations

PERIODICAL: Fizika metallov i metallovedeniye, v. 12, no. 6, 1961, 846 - 852

TEXT: As is the case with Li, the body-centred cubic crystal structure of Na undergoes a partial change to close-packed hexagonal on cooling below 35 °K. A so-called "deformation" modification of this metal can be obtained by straining it plastically at temperatures below 80 °K and the object of the present investigation was to check whether the effect of low-temperature polymorphism of Na on its mechanical properties is similar to that observed earlier by the authors (Ref. 1: FMM, 1960, 10, 472) in Li. To this end, tensile tests were carried out at 1.6 - 290 °K on polished and etched test pieces of 99.8% pure Na and the following properties were

Card 1/4

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

determined: 0.2% proof stress; UTS; true tensile strength; elongation; reduction in area and the strain-hardening coefficient. In addition, the microhardness of each fractured specimen was measured at 77 °K, side-by-side with that of a pilot (i.e. untested) specimen. Typical results are reproduced graphically. In Fig. 2 the elongation (δ, % - lefthand scale) and reduction in area (ψ, % - righthand scale) are plotted against the test temperature (°K). The temperature-dependence of 0.2% proof stress ($\sigma_{0.2}$), UTS (σ_b) and true tensile strength (σ_u) is reproduced in Fig. 3. Finally, in Fig. 4 the microhardness (H, kg/mm^2) measured at 77 °K is plotted against the temperature (°K) to which the test piece had been cooled prior to hardness test; the lower curve relates to pilot specimens, the upper curve representing results obtained near the neck of fractured tensile-test pieces. Several conclusions were reached.

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

S/126/61/012/006/007/023
E193/E383

1) Anomalous variation of mechanical properties of Na in the sub-zero temperature range is associated with polymorphic transformations taking place at these temperatures.
2) The martensitic transformation which on cooling takes place in Na at about 35 °K is reflected in a sharp increase in its yield strength, UTS and microhardness.
3) A minimum in the elongation versus temperature curve is situated in the temperature range within which the deformation-induced polymorphic transformation takes place. The rapid increase in elongation on cooling from 70 to 1.6 °K can be attributed to the deformation-induced change from body-centred cubic to close-packed hexagonal crystal structure.
4) The low-temperature polymorphic transformations (particularly the martensitic transformation) bring about an increase in the degree of strain-hardening and uniformity of the plastic flow of Na. There are 4 figures, 1 table and 12 references: 6 Soviet-bloc and 6 non-Soviet-bloc. The four latest English-language references mentioned are:

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

Mechanical properties of S/126/61/012/006/007/023
E193/E383

Ref. 2: C.S. Barrett - Phys.Rev., 1947, 72, 245; Acta crystallog., 1956, 9, 671; Ref. 8: D. Hull, H.M. Rosenberg, Phys.Rev.Let., 1959, 2, 5; Ref. 10: D. Hull, H.M. Rosenberg - Phil.Mag., 1959, 4, 303; Ref. 12: D. Gugan, J.S. Dugdall, J. Can. Phys. Rev., 1958, 36, 1248.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN UkrSSR (Physicotechnical Institute of the AS UkrSSR)

SUBMITTED: May 3, 1961

Card 4/8

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

S/053/61/074/001/001/003
B117/B212

AUTHORS: Garber, R. I., and Gindin, I. A.

TITLE: Physical properties of high-purity metals

PERIODICAL: Uspekhi fizicheskikh nauk, v. 74, no. 1, 1961, 31 - 60

TEXT: The present survey deals with papers which have been published in recent years in the field of high-purity metals. The papers show a trend to obtain specimens of ever-increasing purity. They also show that the progress made varies for different metals (appendix). The physical problems associated with such metals are discussed, for whose analysis the purity of the specimens is decisive. These problems include the electrical resistance, the reflectance of the metals, the magnetic permeability, nuclear reactions, effects of radioactive irradiation, grain boundaries, latent energy of plastic deformation, relaxation, recrystallization, internal friction, moduli of elasticity,and mechanical properties. The latter include the plasticity, deformation curve, cold-brittleness and creeping. A glance at the material available shows that great progress has been made in the analysis of high-purity metals. The most urgent task at present

Card 1/3

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

seem to be to develop methods for industrial production of these metals. So far, it has been impossible to solve the problem concerning the changes of physical properties of metal effected by small additions. Regarding the electrical resistance, the joint effect of local distortions by foreign atoms and other causes, such as vacancies etc., may be considered to be proved. The mechanical properties are very sensitive toward additions, especially with respect to structural changes occurring during crystallization or other thermal processes. Vacancies and local distortions seem to play a minor role only. The brittleness of various metals can be eliminated by purifying them from additions. A further development of new methods for the separation of metals will find new fields of application for high-purity metals. References to publications on high-purity metals are given for the following elements: Al, Ba, Be, V, W, Bi, Ga, Ha, Fe, Au, In, Cd, Ka, Ko, Mg, Mn, Cu, Mo, Ni, Nb, Pt, Sn, Pb, Ag, Sr, Sb, Ta, Ti, Th, U, Cr, Zn, and Zr. The following Soviet authors are mentioned: L. S. Kan, B. G. Lazarev (Ref.1: DAN SSSR 81, 1027 (1951); V. B. Zernov, Yu. V. Sharvin (Ref.7: ZhETF 36, 1038 (1959); B. N. Aleksandrov, B. I. Verkin (Ref.8: ZhETF 34, 1655 (1958); A. I. Sudovtsov, Ye. Ye. Semenenko (Ref.18: ZhETF

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

35, 305 (1958); I. M. Lifshits, M. I. Kaganov (Ref.29: UFN 69, 419 (1959); B. Leks (Ref.30: UFN 70, 111 (1960); A. S. Zaymovskiy, G. Ya. Sergeyev, V. V. Titova, B. M. Levitskiy, Yu. N. Sikurskiy (Ref.34: Atomnaya energiya 5, 412 (1958); M. Ya. Gal'perin, Ye. P. Kostyukova, B. M. Rovinskiy, Izv. AN SSSR, ser. tekhn. 4, 82 (1959); D. Ye. Ovsiyenko, Ye. I. Sosnina, (Ref. 60: Voprosy fiziki metallov i metallovedeniya, sb. no. 9, Kiyev (1959) str. 185); V. A. Pavlov (Ref.64: Fiz. metallov i metallovedeniye 4, 1 (1957); V. A. Zhuravlev, (Ref.72: Zavodskaya laboratoriya 14, 687 (1959); V. S. Yemel'yanov, A. I. Yevstyukhin, D. D. Abonin, V. I. Statsenko, ("Metallurgiya i metallovedeniye chistykh metallov" vyp. 1, 1959, 44). There are 18 figures, 7 tables, and 144 references: 61 Soviet-bloc and 83 non-Soviet-bloc. The six references to English-language publications read as follows: D. J. Maykut, Prod. Engineering 24, 186 (1953) - (Ref.31); A. N. Holden, Phys. Metal. of Uranium Massachus., 1958, str. 7 (Ref.33); J. C. Blade, Rev. metallurgie 54, 769 (1957) (Ref.50); P. Gordon, J. Metals 7, 1043 (1955); (Ref.51); C. Zener, Phys. Rev. 74, 639 (1948) (Ref.68); T. R. Barrett, G. G. Ellis, R. A. Knight, Proc. Sec. Int. Conf. Geneva 5, 319, 320 (1958) (Ref. 100).

Card 3/3

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

S/181/62/004/002/027/051
B101/B102

AUTHORS: Gindin, I. A., Kozinets, V. V., and Starodubov, Ya. D.

TITLE: Comparison of structural changes in nickel caused by deformation at 4.2 and 300°K and by subsequent creeping

PERIODICAL: Fizika tverdogo tela, v. 4, no. 2, 1962, 465-469

TEXT: Experiments with high-purity nickel (99.994%) tempered at 800°C and $3 \cdot 10^{-6}$ mm Hg and subsequently deformed by 3.5% at 4.2 or 300°K by stretching are reported. Some of the specimens were subsequently kept at room temperature for 80 - 100 hrs and subjected to creep tests at 700°C and constant pressure (2.8 kg/mm^2), while others were heated from 4.2°K to 700°C within 1.5 - 2 min and likewise subjected to creep tests. Both stretching and creeping were carried out with machines described in FMM, 7, 794, 1959. A sharply focused X-ray tube, designed by B. Ya. Pines (Ostrofokusnyye rentgenovskiye trubki i prikladnoy rentgenostrukturnyy analiz (Sharply Focused X-ray Tubes and Applied X-ray Analysis) GITTL,

Card 1/3

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

1955) was used to examine the X-ray structure of the specimens. The disorientation was calculated according to P. B. Hirsch (see below). Results: The original specimens possessed large subgrains (80μ), the lattice was not distorted, and the disorientation was less than 1°. Disorientation reached 8° at 4.2°K, but was less at 300°K. Specimens deformed at 4.2°K underwent relaxation when heated to room temperature. The distortion of the lattice decreased as a result of polygonization of the subgrain fragments. Microdistortions diminished further on heating to creep temperature. The specimen deformed at 4.2°K and subsequently kept at room temperature had a more uniform and more disperse structure than the specimen heated directly from 4.2°K to 700°C. The removal of microdistortions of the specimens, especially of that deformed at 4.2°K, and the increase in disorientation during the creeping process, indicate that the substructure depends on the temperature at which deformation has taken place. There are 2 figures and 9 references: 8 Soviet and 1 non-Soviet. The reference to the English-language publication reads as follows: P. B. Hirsch, J. N. Kellar, Acta Crystal., 5, 162, 1952.

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

Comparison of structural changes in ... S/181/62/004/002/027/051
B101/B102

ASSOCIATION: Fiziko-tekhnicheskiy institut AN USSR, Khar'kov (Physicotechnical Institute, AS UkrSSR, Khar'kov)

SUBMITTED: September 22, 1961

Card 3/3

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

GINDIN, I.A.; KOZINETS, V.V.; STARODUBOV, Ya.D.; KHOTKEVICH, V.I.

Structural changes in copper depending on low-temperature deformation and subsequent annealing. Fiz.met.i metalloved. 14 no.6:864-873 D '62. (MIRA 16:2)

1. Fiziko-tekhnicheskiy institut AN UkrSSR i Khar'kovskiy gosudarstvennyy universitet.

(Copper--Metallography)
(Metal, Effect of temperature on)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

S/032/62/028/001/014/017
B116/B108

AUTHORS: Garber, R. I., Gindin, I. A., Neklyudov, I. M., Chechel'nitskiy, G. G., and Stolyarov, V. M.

TITLE: Device for programmed metal hardening

PERIODICAL: Zavodskaya laboratoriya, v. 28, no. 1, 1962, 107 - 109

TEXT: A device has been designed for programming the load on samples. It permits determining the effect of the charging rate on the material properties up to 800°C in a vacuum of 10^{-6} mm Hg or in inert gases. The charging rate can be increased from 10 g/mm^2 per hr to 3 kg/mm^2 per hr. Moreover, rates of up to 80 kg/mm^2 per hr are possible. The maximum load is 350 kg. The sample elongation (up to 4 - 5 mm with an error of 0.5 μ) is measured with an optical strain gauge. Reduction of the charging rate to values corresponding to diffusion hardening lowers both the total deformation and the rate of steady creep. The device (Fig. 1) operates as follows: Dynamometer spring (6) is compressed by the reducing gear (7). The charging rate is regulated by varying the periodic operation of the motor (8) (РД-09 (RD-09)-type) driving the gear

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

(7). The sample is heated by a tubular furnace with molybdenum coil, and the temperature is regulated by an ЭПД-12 (EPD-12) electronic potentiometer. There are 4 figures and 6 Soviet references.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk USSR (Physico-technical Institute of the Academy of Sciences UkrSSR)

Fig. 1. Diagram of device for programmed hardening.
Legend: (1) sample; (2) and (3) fastenings; (4) cross piece; (5) three bars; (6) dynamometer spring; (7) reducing gear; (8) motor; (9) ball-bearing joint; (10) indicator; (11) mains connection; (12) base plate; (13) vacuum chamber; (14) sylphon; (15) limiter; (16) to pump.

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

Device for programmed metal hardening

S/032/62/028/001/014/017
B116/B108

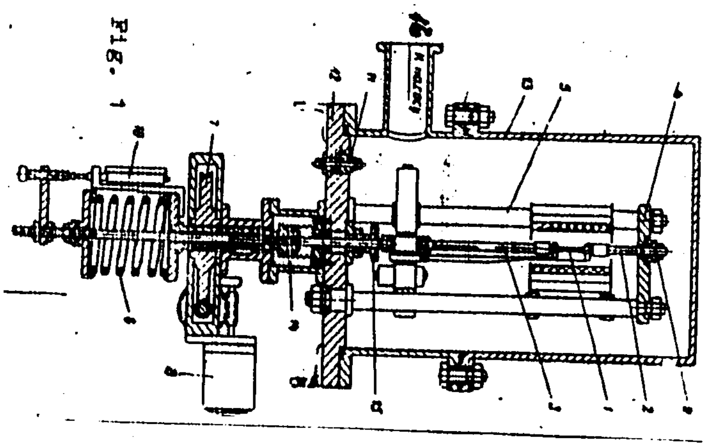

Fig. 1

Card 3/3

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

GARBER, R.I.; GINDIN, I.A.; MALIK, N.I.; STARODUBOV, Ya.D.

Machine for testing materials for tension and compression at the temperatures from 1,4 to 1500 K. Zav.lab. 28no.7:865-868 '62 (MIRA 15:6)

1. Fiziko-tekhnicheskiy institut AN USSR.
(Testing machines)

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

37382

S/020/62/143/006/011/024
B164/B101

18.8200

AUTHORS: Gindin, I. A., Starodubov, Ya. D., and Azhazha, V. M.

TITLE: Increase of the creep resistance of nickel by prior deformation at 4.2°K

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 6, 1962, 1325-1327

TEXT: The effect of small deformations of nickel at 4.2°K on its creep resistance at higher temperatures was examined by tempering small specimens of high-purity nickel (99.994%) in vacuo at 800°C and then drawing them at 4.2°K, the rate of drawing being 0.03 mm/sec and the degree of deformation 1.7 or 3.5%, afterward establishing the creep curves under a constant stress of 2.8 kg/mm^2 in vacuo at 700°C. For comparison, tempered specimens which had been deformed at room temperature were used as standards. An increase in creep endurance from 40 to 106 hrs (after 3.5% deformation) and a 4.5-fold increase in creep strength were obtained. Specimens prestrained at 300°C gave much lower values amounting to 51.5 hrs and to a 1.37-fold increase, respectively.

Card 1/2

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

S/020/62/143/006/011/024
B164/B101

Increase of the creep resistance ...

Microphotographs of the specimens show that those deformed at 4.2°K present greater homogeneity of fine structure than the others. There are 2 figures and 1 table.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk USSR (Physicotechnical Institute of the Academy of Sciences UkrSSR)

PRESENTED: January 26, 1962, by G. V. Kurdyumov, Academician

SUBMITTED: September 22, 1961

Card 2/2

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

ACCESSION NR: AT4013981 S/3070/63/000/000/0116/0118

AUTHOR: Gindin, I. A.; Starodubov, Ya. D.

TITLE: Device for metallographic and radiographic investigations of the structure of solid bodies during deformation at low temperatures

SOURCE: Novy*ye mashiny*i pribory*dlya ispy*taniya metallov. Sbornik statey. Moscow, Metallurgizdat, 1963, 116-118

TOPIC TAGS: low temperature metallography, low temperature radiography, microphotography, deformation, metal deformation

ABSTRACT: Devices described in the literature are intended either for determination of mechanical properties of solid bodies at low temperatures, or for low-temperature metallography. However, these devices do not permit direct observation of changes in structure of a specimen during the process of its stressing at low temperatures. Metallographic and usually radiographic investigations of structure of deformed specimens are performed after the specimens have regained room temperature, despite irreversible changes in them. A device has been developed by the authors permitting observation, photographing and taking of motion pictures of changes on the surface of a specimen during cooling, deformation at

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

low temperature, and subsequent heating. The device is also suitable for radiographic investigations of structure in solid bodies during cooling, low-temperature deformation, and heating. The design of the device permits cooling a specimen down to approximately 10K, measuring this temperature, deforming a specimen in tension or compression, and simultaneously recording values for the "load-deformation" diagram. A schematic illustration of the device is given in Fig. 1 of the Enclosure. The test specimen 1, in the form of flat plate enlarged at its ends, is gripped by jaws 2 located in a depression of the mounting table. One of the jaws is fixed to the table; the other is connected to rod 3 of the loading mechanism and is guided by grooves in the table. The cooling of the specimen to the required temperature is provided through a copper conductor 4 (25 mm in diameter), the lower part of which is immersed in a liquid coolant contained in the vacuum-bottle 5. In order to increase the cooling rate and to reduce the temperature difference between test specimen and coolant, circulation of the coolant is provided through an axial bore in the conductor 4 and tubes 6 and 7. For regulation of the specimen temperature and of the cooling rate, a resistance 8 is provided and a heater 9 in the lower part of the mounting table. The specimen temperature is measured by a thermocouple or a pick-up resistor. The wire connections of the temperature pick-up pass through vacuum insulators 10. The mounting table with the

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

specimen and part of the cooling conductor are located in a vacuum test chamber 11. The upper part of the chamber is flanged for connection with cover 12. Observation and photographing of the specimen microstructure during the test are conducted through a window in the cover. For observation and photographing of specimen surface changes, the optical part of the device PMT-3 with a photographic attachment are used; and for taking motion pictures, the "Kiyev"-type camera. To avoid condensation of moisture on the specimen, high vacuum is applied to the test chamber 11 by an adsorption-type pump through the hose connection 14. The vacuum is maintained by a thin layer of activated charcoal 15. A copper shield is provided for heat protection of the specimen. The loading device consists of a worm gear reducer 16, driven by the electro-motor 17. The worm gear is mounted on a threaded spindle rotating freely in bushing 18. The bushing is fixed in body 19 of the loading device and takes the thrust during loading of the specimen. The thrust from the spindle is transmitted to a moving cylinder 20, closed from one side and containing the calibrated loading spring 21, acting from one side on the bottom of the cylinder 20 and from the other side on a flange connected to the rod 3 of the movable jaw 2. To a thicker part in the central portion of the rod 3, a bellows 22, having a working stroke of 12 mm, is soldered. The working pins of two dial gages 23 tie to rod 3. The left gage (see Fig. 1 of the Enclosure) is fixed to the body 19 of the device and serves for measuring the absolute elongation (or shortening) of the specimen. The right gage is fastened to the movable cylinder 20 through a plate 24, and

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

ACCESSION NR: AT4013981

measures the deflection of spring 21, i.e., the load applied to the specimen. A yoke with three ribs 25 provides greater bending stiffness to conductor 4. The specimen is subjected to a constant-speed axial deformation of 0.03 mm/sec, and a maximum load of 200 kg can be applied. For X-ray investigations at low temperatures, a small chamber for photographing by reflection has been devised (see Fig. 2 of the Enclosure), which can be flanged to the test chamber and sealed by a rubber gasket. A beryllium window 2, 12 mm in diameter and 0.3 mm thick, is used to introduce the X-ray beam into the test chamber. Inside the chamber, a magazine with film 3 is mounted and a sector screen 4 of lead underneath the magazine. The screen permits taking four X-ray pictures without disturbing the vacuum in the chamber, and consequently without heating the specimen. The screen has to be rotated 90° after each exposure. The height of the film magazine location over the sample is adjustable. For making of radiograms, a sharp-focussed X-ray tube designed by B. Ya. Pines is used. A photographic camera can be installed to take microphotographs and radiograms of the same spot of the sample. The residual pressure in the vacuum chamber is 10^{-5} to 10^{-6} mm Hg. The temperature of the specimen depends on the coolant used and is 78K with liquid nitrogen, 25K with liquid hydrogen, and 10K with liquid helium. Orig. art. has: 2 figures.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN USSR (Institute of Physics and Technology AN USSR)

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

ACCESSION NR: AT4013981

SUBMITTED: 00 DATE ACQ: 20Feb64 ENCL: 02

SUB CODE: MM NO REF SOV: 010 OTHER: 000

Card 5/7

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

ACCESSION NR: AT4013981

ENCLOSURE: 01

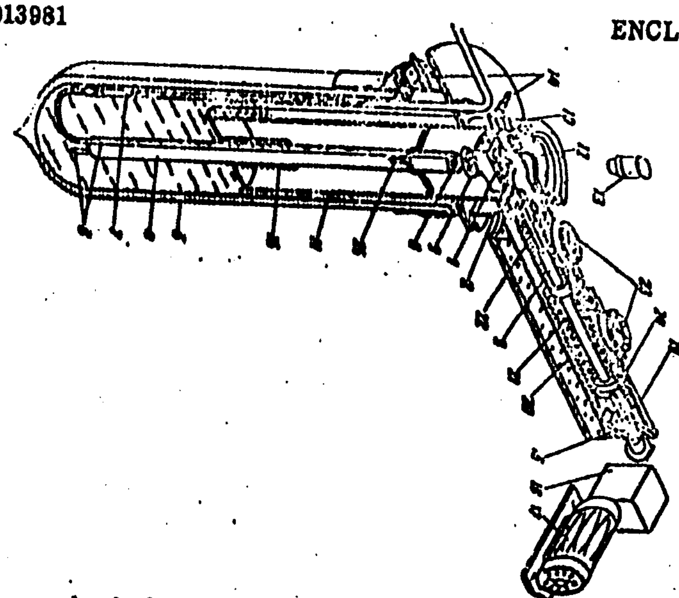

Fig. 1. Device for mechanical tests, metallographic and X-ray investigations at low temperatures

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

ACCESSION NR: AT4013981 ENCLOSURE: 02

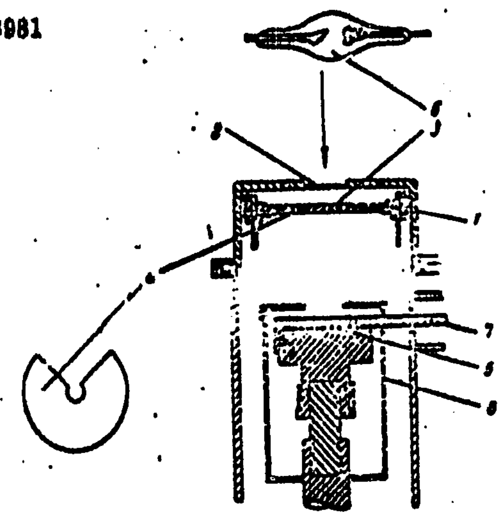

Fig. 2. Chamber for X-ray investigation of structure of solids under deformation at low temperatures. 1 - body of chamber, 2- beryllium window, 3 - magazine with film, 4 - sector screen (lead), 5 - test specimen, 6 - X-ray tube, 7 - jaw for loading of specimen, 8 - shield

Card 7/7

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0

L 13305-63 EPF(n)-2/EWP(q)/BDS/EWP(r)/EWT(1)/EWT(m) AFFTC/ASD/
ESD ... IJP(C)

ACCESSION NR: AP3002746 S/0120/63/000/003/0169/0171

AUTHOR: Gindin, I. A.; Kravchenko, S. F.; Starodubov, Ya. D.; Godzhayev, V. M.

67
66

TITLE: Outfit for studying metal creep at low temperatures

SOURCE: Pribory* i tekhnika eksperimenta, no. 3, 1963, 169-171

TOPIC TAGS: metal creep, low-temperature creep

ABSTRACT: A new design of the outfit for studying metal creep within 300-4.2K at a 100-kg maximum load is described. The outfit comprises: (1) a mechanism for program loading the specimen, (2) a high-sensitivity mechano-optical primary detector of small deformations, (3) an optical device with a camera for recording the elongation-time chart, (4) a liquid-level controller for the Dewar vessel, and (5) clamps for fastening the specimen. A functional diagram illustrates operation of the outfit. The following characteristics are given: rate of loading is 2.5 kg/min; deformation-time scale factor is 0.5 micron in 1 mm of the elongation axis or 30, 60, 120 min in 1 mm of the time axis; average daily variation of the light spot about the horizontal time axis is 0.5 micron; lever sensitivity is 0.1 micron/g; specimen diameter is 1, 2, or 3 mm; specimen length is 130 mm; error in deformation

Association: [redacted] Physico-Technical Inst. AN UkrSSR

Card 1/2

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

GARBER, R.I.; GINDIN, I.A.; CHIRKINA, L.A.

Twinning and annealing of nonequilibrium iron-nickel alloy of the Sikhote-Alin iron meteorite. Meteoritika no.23:45-55 '63. (MIRA 16:9)

(Sikhote-Alin Range—Meteorites)

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

GARBER, R.I.; GINDIN I.A.; SHUBIN, Yu.V.

Compression of beryllium single crystals along the hexagonal axis in the temperature range 4.2° to 900° K. Fiz. tver. tela 5 no .2: 434-442 F '63. (MIRA 16:5)

(Beryllium crystals) (Strength of materials)

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

GINDIN, I.A.; KRAVCHENKO, S.F.; STARODUBOV, Ya.D.; GODZHAYEV, V.M.

Apparatus for studying the creep of metals at low temperatures.
Prib. i tekh. eksp. 8 no.3:169-171 My-Je '63. (MIRA 16:9)

1. Fiziko-tekhnicheskiy institut AN UkrSSR.
(Creep of metals) (Metals at low temperatures)

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

GARBER, R.I.; GINDIN, I.A.; STOLYAROV, V.M.; CHECHEL'NITSKIY, G.G.;
CHIRKINA, L.A.

Apparatus for studying the damping of low-frequency torsional oscillations. Prib. i tekh. eksp. 8 no.3:172-174 My-Je '63.
(MIRA 16:9)

1. Fiziko-tekhnicheskiy institut AN UkrSSR.
(Oscillations--Electromechanical analogies)

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

AZHAZHA, V.M.; GINBIN, I.A.; STARODUBOV, Ya.D.

Comparing the effect of prestressing at 4.2 and 300° K on the creep characteristics of nickel at 700°C. Fiz.met. i metalloved. 15 no.1:119-124 Ja '63. (MIRA 16:2)

1. Fiziko-tekhnicheskiy institut AN UkrSSR.
(Nickel—Cold working) (Creep of nickel)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
S/126/63/015/003/022/025
E073/E320

AUTHORS: Garber, R.I., Gindin, I.A. and Neklyudov, I.M.

TITLE: Influence of "programmed strengthening" on the creep and recrystallization of iron at elevated temperatures

PERIODICAL: Fizika metallov i metallovedeniye, v. 15, no. 3, 1963, 473-475

TEXT: In earlier investigations on calcite, bismuth and iron, the authors found that in addition to ordinary strengthening caused by lattice distortions during the process of plastic deformation under a continuous load, there is also "programmed strengthening" due to diffusion-blocking and strengthening of weak and overloaded lattice nodes. This produces an increase in the yield point, plasticity at low temperatures and an increased creep resistance. So far, an improvement in the mechanical properties has been observed only at temperatures lower than or equal to the temperature of the programmed treatment. In the work described here, specimens of Fe (0.03% C) were polished and chemically etched, vacuum-annealed at 880 °C for 3 hours and then slowly cooled. After "programmed loading" up to 8 kg/mm^2 at 300 °C at

Card 1/3

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

S/126/63/015/003/022/025
E073/E320

Influence of ....

a rate of 90 g/mm^2/h, the specimens were subjected to a 100-hour creep test at 400 °C with a load of 7 kg/mm^2. The creep rate of previously program-loaded specimens was significantly lower (about 5.6 x 10^{-5} %/h) both in the initial and in the steady-state stages) than that of specimens to which the final load had been applied quickly (1.3 x 10^{-4} %/h in the steady-state section). This indicates that overheating does not eliminate the effect of increased resistance to creep of program-strengthened specimens. Microstructures are reproduced of both types of specimens after annealing at 830 °C for 3 hours; of specimens loaded at 400 °C with a load increasing to 16 kg/mm^2, whereby the rate of increase varied between 220 and 6 x 10^5 g/mm^2/h; of specimens loaded quickly. The residual deformations were 1.3 and 1.6%, respectively. The microstructure of specimens which were subjected directly to the final load showed signs of selective recrystallization, whilst the microstructure of the program-loaded specimens was almost the same as prior to annealing. The authors consider the results as a further proof that program-loading leads to a more

Card 2/3

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

equilibriated stable structure in that the strengthening does not seem to be accompanied by an increase in the free energy of the crystal. There are 3 figures.

SUBMITTED: August 15, 1962

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

L 10109-63 EPF(c)/EPF(n)-2/EWP(q)/EWT(m)/BDS AFFTC/ASD/SSD Pr-4/
Pu-4 WW/JD/JP(C)
ACCESSION NR: AP3001599 S/0126/63/015/005/0729/0735 14

AUTHOR: Azhazha, V. M.; Gindin, I. A.; Starodubov, Ya. D.; Shapoval, B. I. 71

TITLE: Effect of low-temperature prestrain on the creep and internal friction of copper 18 18

SOURCE: Fizika metallov i metallovedeniye, v. 15, no. 5, 1963, 729-735

TOPIC TAGS: commercial-grade copper, subzero-temperature prestraining, annealing, creep characteristics, internal friction, microstructure changes

ABSTRACT: The effect of low-temperature prestrain on the creep, microstructure, and internal friction of commercial-grade copper was studied. Test specimens annealed in a high vacuum for 2 hr at 850C were prestretched 2.5, 5.0, 7.5, 12.5, or 35% at a constant rate of 0.03 mm/sec at temperatures of 300 or 4.2K. Specimens prestretched at 4.2K were annealed at room temperature for 100 hr. Both groups of specimens were then subjected to short-time creep tests in a vacuum of 0.02 mm Hg at 500C under a stress of 2 kg/mm sup 2. The tests showed that a prestrain of up to 7.5% at room temperature or subzero temperature sharply decreased the rates of the first and second creep stages. The second-stage creep rate, for instance, decreased from 0.95%/hr for annealed specimens, to 0.09 and 0.05%/hr for specimens

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

L 10109-63
ACCESSION NR: AP3001698

3

prestrained 7.5% at 300 and 4.2K. The rupture strength of approximately 6.5 hr for annealed specimens increased to approximately 10.0 and 12.3 hr for the specimens prestretched 7.5% at 300 and 4.2K. The purer the metal and the coarser the grain, the higher the effect of prestraining. Oxygen-free copper prestretched 7.5% at 300 or 4.2K and tested under the above conditions had a creep rate of 0.02 or 0.01%/hr and a rupture life of 19.5 or 24 hr. The 10% elongation and reduction of area of the annealed specimen decreased to 4% for the specimens prestrained 7.5% at 4.2 and 300K. Prestrain at 4.2K strengthens grain boundaries and adjacent grain zones and promotes formation of a substructure. This sharply reduces the number of microcracks formed along grain boundaries during creep and inhibits intergranular failure of the metal. Low-temperature prestrain reduces internal friction in copper and significantly increases the temperature at which it begins to rise sharply, e.g., from approximately 100C for annealed specimens to 320 and 470C for specimens prestrained at 300 and 4.2K. Orig. art. has: 1 table and 8 figures.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN USSR (Physicotechnical Institute, AN USSR)

SUBMITTED: 11Nov62 DATE ACQ: 11Jul63 ENCL: 00

SUB CODE: 00 NO REF SOV: 016 OTHER: 003

Card 2/2

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0

L 10751-63 ENT(1)/EWP(q)/EWT(m)/BDS--AFFTC/ASD--Ps-4--WW/JD

ACCESSION NR: AP3001700

S/0126/63/015/005/0736/0747

67

AUTHOR: Gindin, I. A.; Starodubov, Ya. D.

TITLE: Concerning the ductility of polycrystalline niobium at helium temperatures

SOURCE: Fizika metallov i metallovedeniye, v. 15, no. 5, 1963, 736-747

TOPIC TAGS: mechanical properties of Nb, helium temperatures, microstructure, microhardness, deformation mechanism, multiple necking, nonductility transition temperature

ABSTRACT: The mechanical properties of Nb in the temperature range from 1.4 to 300K have been investigated. Nb wire (0.1% Ta, 0.038% Ti, 0.05% Fe, 0.03% Si) 3 mm in diameter was drawn to diameters of 1.94, 1.17, or 1.03 mm with process annealing. The specimens were then vacuum annealed at 1800—2400C to remove impurities, especially gases (see Table 1 of Enclosure). The average grain size in all annealed specimens was the same, approximately 75—100 μ. Tensile tests at 1.4—300K at a strain rate of 0.03 mm/sec showed that pure Nb retains substantial ductility even at temperatures close to absolute zero (see Table 2 of Enclosure). Between 200 and 140K the elongation drops; at temperatures below 20K reduction of area rises sharply. At temperatures below 20K the strain-stress curves have a sawlike shape, which is caused by multiple necking. Up to 9 neckings formed on the specimens tested at 4.2K. The microhardness along the gage

L 10751-63

ACCESSION NR: AP3001700

length varied from a maximum of 92.5 kg/mm² in the neckings to a minimum of 54—60 kg/mm² between the neckings. Microscopic examination showed that plastic deformation in the whole range from 1.4 to 300K occurs by a slip. Some slip lines were straight and some wavy. Twin crystals were observed only with deformation temperatures and only in some specimens below 77K. "The authors are grateful to B. G. Lazarev for continued interest in the work and for valuable advice." Orig. art. has: 9 figures, 2 tables, and 2 formulas.

ASSOCIATION: none

SUBMITTED: 15Aug62 DATE ACQ: 11Jul63 ENCL: 02

SUB CODE: ML NO REF SOV: 006 OTHER: 017

Card 2/3

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

L 18049-65 EWT(q)/EWT(m)/BDS AFFTC/ASD JD
ACCESSION NR: AP3002850 S/0126/63/015/006/0908/0913

60
54

AUTHORS: Garber, R. I.; Gindin, I. A.; Neklyudov, I. M.

TITLE: Programmed hardening of commercial iron 27

SOURCE: Fizika metallov i metallovedeniye, v. 15, no. 6, 1963, 908-913

TOPIC TAGS: programmed hardening, iron, mechanical property

ABSTRACT: One of the possible methods for improving mechanical properties 18 of solid bodies consists of diffusive blocking and strengthening of weak or over-stressed parts of a specimen. Such parts may develop shearing, sliding surfaces, twinning bands, or dislocation sources. This method was called "the programming of hardening." The device used in the programming procedure is described. It allows the stretching of a specimen at high temperatures and at very small rates of load increase. The commercial iron samples that underwent a programmed hardening at 200C were studied. The tensile test was conducted at the temperature of liquid nitrogen and also at room temperature. The creep test was also conducted at 200C. Preliminary deformation at high temperatures and low rates of loading resulted in: 1) increase of flow limit and hardening modulus; 2) increase in plasticity at the temperature of liquid nitrogen; 3) a substantial decrease in creep velocity;

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

L 18049-63

ACCESSION NR: AP3002850

3

) elimination of creep at 3000. It is concluded that the observed effects are due to a diffusive hardening of weak and overstressed regions in the samples. The authors express their appreciation to V. M. Stolyarov and G. G. Chechel'nitskiy for their help in the construction of this device. Orig. art. has: 6 figures.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN USSR (Institute of Physics and Technology, Academy of Sciences, UkrSSR)

SUBMITTED: 26Jun62 DATE ACQ: 23Jul63 ENCL: 00

SUB CODE: ML NO REF SOV: 008 OTHER: 001

Card 2/2

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

GINDIN, I.A.; LAZAREV, B.G.; KHVEDCHUK, I.R.

Dilatometric investigation of the low-temperature deformation transition to lithium. Fiz. met. i metalloved. 16 no.5 793-794 N '63. (MIRA 17:2)

1. Fiziko-tekhnicheskiy institut AN UkrSSR.

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

ACCESSION NR: AP4037066 S/0129/64/000/005/0044/0046

AUTHOR: Gindin, I. A.; Lazareva, M. B.; Nikishov, A. S.; Rink, L. P.; Starodubov, Ya. D.; Yarov, I. A.

TITLE: Mechanical properties of structural alloys at low temperature

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 5, 1964, 44-46

TOPIC TAGS: alloy, structural alloy, austenitic iron alloy, Kh25N16G7AR alloy, Kh12N20T3R alloy, Kh16G9AN4 alloy, KhN35VTYu alloy, titanium alloy, OT4 alloy, copper alloy, BrKh08 alloy, ZhS6KP alloy, steel, martensitic steel, VNS2 steel, EI659 steel, cryogenic alloy

ABSTRACT: Mechanical properties and fracture tests of Kh25N16G7AR, Kh12N20T3R, Kh17G9AN4, KhN35VTYu; austenitic iron base alloys VNS2 (EP225) and EI659, martensitic steels, ZhS6KP high-strength alloy, OT4 titanium alloy, BGKh08 copper alloy, and other [unidentified] alloys were investigated at temperatures in the 4.2—300K range.

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

ACCESSION NR: AP4037066

Specimens (either flat with a cross section of 1.5 x 2 mm or round and 2.2 mm in diameter) were tested in a heat-treated condition [shown in the article]. With a decreasing test temperature the resistance to plastic deformation and the tensile strength of all alloys increased. This was found to be particularly pronounced in the case of VNS2 alloy which at 293, 77, and 20K had a tensile strength of 97.5, 155.0, and 180.0 kg/mm^2 (annealed at 950C, air cooled, and tempered at 620C for 1 hr). All alloys were found to maintain some ductility at temperatures as low as that of liquid hydrogen except for E1659 steel and OT4 alloy which failed with respective elongations of 0%(at 20K) and 0.7% (at 77K). The elongation of the VNS2 alloy, on the contrary, was found to increase with a decrease of temperature from 15% at 293K to 20% at 20K. BGKh08 copper-base alloy was also very ductile at low temperatures (at 4.2K an elongation of 18.6%). A simultaneous increase of the ductility and strength of VNS2 alloy might be explained by some changes of phase composition under the effect of low-temperature deformation. All the materials tested at temperatures down to 20K yielded uniformly, some with, some without necking. Only in the case of the VNS2 steel did the strain-stress curve at 20K have a saw-like

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

ACCESSION NR: AP4037066

shape. However, at temperatures above 20K the steel yielded uniformly. The fracture mode was ductile with clearly expressed necking even at 20K. Orig. art. has: 1 figure and 1 table.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN USSR (Physico-technical Institute, AN USSR)

SUBMITTED: 00 DATE ACQ: 05Jun64 ENCL: 00

SUB CODE: MM NO REF SOV: 002 OTHER: 000

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

GARBER, R.I.; GINDIN, I.A.; MOGIL'NIKOVA, T.T.; NEKLYUDOV, I.M.

Internal friction of iron hardened by programming. Fiz. met. i metalloved. 18 no.3:443-447 S '64. (MIRA 17:11)

1. Fiziko-tekhnicheskiy institut AN UkrSSR.

[illegible]

[illegible]

[illegible] investigation [illegible]

[illegible]

[illegible]

[illegible]

[illegible] development of [illegible]

SOURCE: [illegible]

[illegible]

[illegible]

[illegible]

[illegible]
[illegible]
[illegible]
[illegible]

[illegible]

[illegible]

[illegible] JOB CODE: [illegible]

[illegible]

[illegible]

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

[illegible]

[illegible]

[illegible]

[illegible]

GINDIN, I.A.; NEKLYUDOV, I.M.; SMELOVA, D.F.

Influence of grain size on the effect of iron hardening during programmed loading. Fiz. met. i metalloved. 19 no.4:627-629 Ap '65. (MIRA 18:5)

1. Fiziko-tekhnicheskiy institut AN UkrSSR.

L 8044-66 EWT(m)/T/EWP(t)/EWP(b)/EWA(c) IJP(c) JD/JG

ACC NR: AP5027148 UR/0126/65/020/004/0603/0607

AUTHOR: Garber, R.I.; Gindin, I.A.; Chirkina, L.A.

ORG: Physicotechnical Institute, AN UkrSSR (Fiziko-tekhnicheskiy institut AN UkrSSR)

TITLE: Low temperature "deformation" polymorphism in lithium by the internal friction method

SOURCE: Fizika metallov i metallovedeniye, v.20, no.4, 1965, 603-607

TOPIC TAGS: lithium, phase transition, internal friction

ABSTRACT: Measurements were made by the method of damping free torsional vibrations of the samples in the temperature interval embracing the transition from a body-centered cubic lattice to a face-centered cubic lattice (78-200°K), at frequencies of 0.7, 0.8 and 1.3 cycles, in the region independent of amplitude. The logarithmic decrement of damping was taken as the measure of internal friction. The lithium samples, of a purity of 99.3%, were prepared by pressing in the mold at room temperature under a layer of kerosene for protection from oxidation. The length of the effective cylindrical section of each sample was 30 mm and the diameter 3 mm. For stress measurements, the sample was annealed for 2-3 days at 300°K, then pickled in methyl alcohol and

Card 1/2 UDC: 548.33:539.67

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

O

cooled to the temperature of liquid nitrogen (78°K), at which temperature it does not oxidize or undergo phase transition, and was mounted in the apparatus for measurement of internal friction in the single phase state (body-centered cubic). To induce the polymorphic transition from the body-centered cubic to the face-centered cubic lattice and to investigate internal friction, part of the samples were previously deformed by torsion at 78°K up to the relative shear, 5.2×10^{-2}. The martensite nature of the "deformation" nature of the transition from a body-centered to a face-centered cubic lattice in lithium is marked in an especially clear manner in experiments on measurement of internal friction during heating of the samples to determined temperatures above and below the temperature of the reverse transitions with intermediate cooling to 78°K, as well as in a study of the frequency dependence of internal friction. Orig. art. has: 3 figures.

SUB CODE: MM, IC/ SUBM DATE: 28Oct64/ ORIG REF: 010

OTH REF: 005

BVK

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

L 24575-66 EWT(m)/T/EWP(t) IJP(c) JD/JH
ACC NR: AP6009671 SOURCE CODE: UR/0181/66/008/003/0842/0845

AUTHORS: Bezuglyy, P. A.; Gindin, I. A.; Neklyudov, I. M.; Rabukhin, V. B.

58
B

ORG: Physicotechnical Institute of Low Temperatures AN UkrSSR, Khar'kov (Fiziko-tekhnicheskiy institut nizkikh temperatur AN UkrSSR)

TITLE: Securing of dislocations 18 on point defects during programmed loading of aluminum 18 single crystals 18

SOURCE: Fizika tverdogo tela, v. 8, no. 3, 1966, 842-845

TOPIC TAGS: hardening, crystal dislocation phenomenon, crystal defect, static load test, ultrasonic absorption, aluminum, single crystal

ABSTRACT: This is a continuation of earlier work (FMM v. 18, 443, 1964 and earlier papers) dealing with various hardening mechanisms that can be activated by varying the rate of increasing an external stress on a crystal and the possibility of programming the hardening on the basis of such mechanisms. The present paper presents the re-

2

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

O

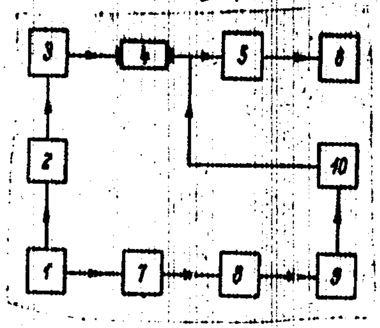

Fig. 1. Block diagram of pulsed ultrasonic installation. 1 -- Master pulse generator, 2 -- modulator, 3 -- high frequency generator, 4 -- sample, 5 -- superheterodyne receiver, 6 -- oscilloscope, 7 -- controlled pulse delay, 8 -- pulse generator, 9 -- standard hf generator, 10 -- attenuator.

sults of an investigation of the dependence of absorption of longitudinal ultrasound on the level of prestressing attained during programmed (slow) hardening of single-crystal aluminum, and the results obtained with fast loading are also given for comparison. Both annealed and non-annealed samples were tested. The absorption was measured by comparing two successive reflected pulses, using an ultrasonic pulsed setup (Fig. 1). All measurements were made with a longitudinal compression-rarefaction wave operating at 72 Mc. From

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

L 24575-66
ACC NR: AP6009671

0

the obtained plots of the ultrasound absorption against the loading it is concluded that securing of dislocations during the earlier stages of the programmed loading is possible. At large degrees of deformation, a maximum of ultrasound absorption is observed. The results are interpreted from the point of view of the dislocation theory of absorption developed by A. Granat and K. Lucke (J. Appl. Phys. v. 28, 583, 1956). Orig. art. has: 3 figures, 5 formulas, and 1 table.

SUB CODE: 20/ SUBM DATE: 28Jul65/ ORIG REF: 006/ OTH REF: 001

Card 3/3 BK

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 . CIA-RDP86-00513R000515110017-0"

ACC NR: AP6017510 (N) SOURCE CODE: UR/0126/66/021/005/0774/0778

AUTHORS: Gindin, I. A.; Neklyudov, I. M.; Finkel', V. A.; Shubin, Yu. V.

ORG: Physico-technical Institute, AN UkrSSR (Fiziko-tekhnicheskiy institute AN UkrSSR)

TITLE: Effects of programmed loading on the plasticity of beryllium monocrystals

SOURCE: Fizika metallov i metallovedeniye, v. 21, no. 5, 1966, 774-778

TOPIC TAGS: beryllium, metal property, metal crystal, crystal property, plasticity

ABSTRACT: The effects of preliminary programmed loading at 400C on the subsequent mechanical properties of beryllium monocrystals at room temperature were investigated. One set of specimens (99.6% pure) with base plane oriented at 45° to the loading axis) was loaded (0, 5, 6, and 10 kg/mm²) and tested in compression. Another set (99.9% pure, base plane and ⟨1010⟩ direction coincided with loading axis) was loaded (0, 4.3, and 5 kg/mm²) and tested in tension. It was found that the room temperature yield stress σ_s and relative compressibility ε were 9.6, 11.3, 11.0, and 9.8 kg/mm² and 10.7, 17.7, 24.7 and 11.2% respectively for the preloading conditions of the first set of specimens and 14.5, 16.1, and 12.4 kg/mm² and 29, 36, and 39.5% respectively for the second set. Elongation was 54, 53, and 64% respectively for the second set. X-ray diagrams of the preloaded monocrystals are also presented. Orig. art. has: 5 figures.

SUB CODE: 11, 13/ SUBM DATE: 31May65/ ORIG REF: 006/ OTH REF: 006

Card 1/1 mcp UDC: 539.37:546.45

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
L 08716-67 EWT(m)/EWP(w)/EWA(d)/ETI/EWP(k) IJP(c) JD/HW
ACC NR: AP6033052 SOURCE CODE: UR/0126/66/022/002/0254/0261

AUTHOR: Gindin, I. A.; Starodubov, Ya. D.; Zakharov, V. I. 43 B

ORG: Physicotechnical Institute, AN UkrSSR (Fiziko-tekhnicheskiy institut AN UkrSSR)

TITLE: Investigation of the effect of low-temperature deformation on the creep resistance of nickel and copper at high temperatures

SOURCE: Fizika i metallov i metallovedeniye, v. 22, no. 2, 1966, 254-261

TOPIC TAGS: nickel, creep, ~~resistance~~, copper, ~~creep resistance, nickel mechanothermal treatment, copper mechanothermal treatment~~ mechanical heat treatment, rupture strength

ABSTRACT: Specimens of oxygen-free copper (99.98%-pure) and vacuum-melted nickel (99.95%-pure), vacuum-annealed at 1050C (nickel) and 900C (copper) for 4 hr, were subjected to low temperature mechanothermal treatment (LMTT) stretched by 3.7% (nickel) or 8% (copper) at 4.2 and 300K, and "annealed" at room temperature for about 100 hr. The specimens were then tested for creep resistance at temperatures ranging from 500C to 1000C. It was found that LMTT improved considerably the rupture life of both metals. For instance (see Fig. 1), the rupture life of untreated nickel specimens at 800C under a stress of 1.3 kg/mm^2

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0

L 08716-67

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

ACC NR: AP6033052

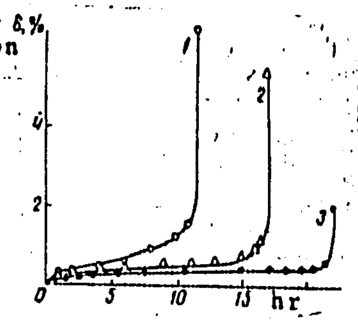

Fig. 1. Primary creep curves of nickel at 800C under a stress of 1.3 kg/mm^2

1 - Untreated specimen; 2 and 3 - specimens stretched at 300 and 4.2K, respectively.

was 11.3 hr, the elongation was 6.5%; the rupture life of specimens deformed at 300 and 4.2K was 17 and 22 hr, and the elongation was 5.8 and 2.0%, respectively. The creep resistance of copper specimens was similarly affected by LMTT. The effect of LMTT on creep behavior is preserved at temperatures up to 1000C for nickel and up to 700—750C for copper. Orig. art. has: 3 figures and 3 tables.

SUB CODE: 13, 11/ SUBM DATE: 10Aug65/ ORIG REF: 011/ OTH REF: 001

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0

ACC NR: AP7004567 SOURCE CODE: UR/0126/66/021/004/0600/0607

AUTHOR: Gindin, I. A.; Godzhayev, V. M.; Lazarova, N. B.; Starodubov, Ya. D.

ORG: Physicotechnical Institute, AN UkrSSR (Fiziko-tekhnicheskiy institut AN UkrSSR)

TITLE: Low-temperature creep of lithium in the region of polymorphous transformation

SOURCE: Fizika metallov i metallovedeniye, v. 21, no. 4, 1966, 600-607

TOPIC TAGS: creep, metal deformation

ABSTRACT: A study was made of creep in Li at 300, 180 and 77 K., encompassing the polymorphous transformation range. The electrical resistance of specimens during the creep process was measured. It is shown that for long-term low-temperature creep of Li, the creep curves show three stages, instantaneous deformation, a transitional stage and a stage of steady flow. At 77 K. the logarithmic rule of the transitional stage of creep is valid up to those values of stress at which polymorphous transition is absent or weakly defined. Creep curves of single-phase specimens at 300 K. even in the case of low stresses, do not comply with the logarithmic rule. A maximum of electrical resistance during creep at 77 K. was found which decreases in a steady pattern in specimens previously strained at 77 K. Orig. art. has: 8 figures. [JPRS: 36,774]

SUB CODE: 20 / SUBM DATE: 09Mar65 / ORIG REF: 005 / OTH REF: 009

Card 1/1

UDC: 539.292:539.376

0926 1455

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0

ACC NR: AP6022042 (A) SOURCE CODE: UR/0120/66/000/003/0225/0226

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

AUTHOR: Gindin, I. A.; Starodubov, Ya. D.; Kravchenko, S. F.; Lazareva, M. B.

ORG: Physico-Technical Institute, AN UkrSSR, Khar'kov (Fiziko-tekhnicheskiy institut AN UkrSSR)

TITLE: A device for rolling metals at temperatures of 4.2-300°K

SOURCE: Pribory i tekhnika eksperimenta, no. 3, 1966, 225-226

TOPIC TAGS: low temperature physics, low temperature metal, low temperature research, metal rolling

ABSTRACT: The device is used to measure the electrical resistance of deformed samples and for carrying out heat treatment in the temperature range from 4.2 to 1000°K. The basic characteristics of the setup are as follows: roller diameter--30 mm; operating length of the rollers--20 mm; rolling speed--1 and 10 mm/min; initial cross section of samples--from 3 to 5 mm^2 (depending on the material). The thickness of the foil obtained is on the order of ten microns. For example, for copper at 20°K, the thickness is 20-30 microns. Orig. art. has: 1 figure.

SUB CODE: 11,20,13/ SUBM DATE: 24Apr65/ ORIG REF: 002/ OTH REF: 002

UDC: 621.59:621.771

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

ACC NR: AP7001543 SOURCE CODE: UR/0020/66/171/003/0552/0554

AUTHOR: Gindin, I. A.; Starodubov, Ya. D.; Lazareva, M. B.; Lazarev, B. G. (Academician AN UkrSSR)

ORG: Physicotechnical Institute Academy of Sciences UkrSSR (Fiziko-tekhnicheskiy institut Akademii Nauk UkrSSR)

TITLE: Low-temperature recrystallization of copper rolled at 77 and 20K

SOURCE: AN SSSR. Doklady, v. 171, no. 3, 1966, 552-554

TOPIC TAGS: copper, low temperature deformation, ~~copper~~ metal deformation, ~~copper~~ metal recrystallization, recrystallization temperature, recrystallization activation energy, metal rolling, grain size, metal physical property

ABSTRACT: Specimens of 99.98%-pure copper with an initial grain size of 100 μ were rolled at 293, 77, and 20K with a 10% reduction per pass and a total reduction of 90%. The specimens were rolled at a speed of 10 mm/min and immediately annealed at 293—468K. X-ray diffraction pattern examination showed that low-temperature deformation decreased the grain size, produced noticeable microdistortion in the lattice, and significantly reduced the temperature of the beginning of recrystallization. Copper deformed with a 90% reduction recrystallized even at room temperature. The lower the deformation temperature, the sooner the recrystallization begins. For instance, in copper rolled at 20K the recrystallization begins after 19 hr, while in copper rolled at 77K-after 2.5 month. With decreasing deformation tempera-

 UDC: 539.2

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

ture from 293 to 20K, the activation energy was found to decrease from 33 to 18 kcal/g-atom. This fact, and also the lowering of the recrystallization temperature, is caused by an increase in the latent deformation energy and by a higher metastability of the crystalline body. The low-temperature recrystallization makes it possible to investigate the metal recrystallization, taking into account the temperature conditions of the activation work straining, and to develop metal structures with special physical properties. V. V. Kozinets and M. P. Starolat are thanked for their assistance in the experiments. Orig. art. has: 2 figures.

SUB CODE: 11, 20, 13/SUBM DATE: 15Jul66/ ORIG REF: 008

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0

ACC NR: AP7005206 APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0" SOURCE CODE: UR/0185/66/011/011/1243/1246

AUTHOR: Hindin, Y. A.--Gindin, I. A.; Malik, H. M.--Malik, G. N.; Nechvolod, M. K.--Nechvolod, N. K; Starodubov, Ya. D.

ORG: Physicotechnical Institute AN UkrSSR (Fiziko-tekhnicheskiy institut AN UkrSSR); Pedagogical Institute, Khar'kov (Pedagogicheskiy institut)

TITLE: Effect of ultrasonic irradiation on the creep of LiF single crystals, II.

SOURCE: Ukrayins'kyy fizychnyy zhurnal, v. 11, no. 11, 1966, 1243-1246

TOPIC TAGS: lithium fluoride, creep, ultrasonic irradiation, crystal dislocation phenomenon, plastic deformation, crystal defect

ABSTRACT: Part I is published in the same issue as part II, which reports an investigation of the influence of prior low-intensity ultrasonic irradiation on the creep of single crystals of LiF to which the load was applied in steps, and the influence on the change in the dislocation structure. The investigations were made on single crystals measur ing 1.5 x 2 x 5 mm having a dislocation density $6 \times 10^4 - 1 \times 10^5$ cm^{-2}. The method of preparing the samples and their etching are described in part I. The creep tests were made under uniaxial compression and under identical conditions. The results show that prior irradiation weakens the samples, leading to an increase in the plastic deformation and to an increase in the creep rate. Prior ultrasonic irradiation also contributes to the lowering of the stress required for the transition from the deformation damping stage to the stage where the deformation increases

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

ACC NR: AP7005206

rapidly under stepwise creep conditions. The results are interpreted from the point of view that the ultrasound lowers the potential barrier for the motion of the dislocations in the crystal and facilitates their motion. It is also possible that point defects are produced under the influence of the ultrasound. Orig. art. has: 5 figures.

SUB CODE: 20, 11/ SUBM DATE: 31Jan66/ ORIG REF: 004/ OTH REF: 008

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

KUPERMAN, Yakov Mironovich, kand.ekon.nauk; YAKUSHEV, Pavel Mikhaylovich. Prinimal uchastiye: GINDIN, I.F., kand.ekon.nauk; BIRMAN, A.M., kand.ekon.nauk, red.; KUTSENOVA, A.A., red.izd-va; EL'KINA, E.M., tekhn.red.; GILENSON, P.G., tekhn.red.

[Working capital of construction organizations] Oborotnye sredstva stroitel'nykh organizatsii. Moskva, Gos.izd-vo lit-ry po stroit., arkhit. i stroit.materialam, 1959. 159 p. (MIRA 12:8)

(Construction industry--Finance)

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

GINDLIN, I.M., inzh.

New cold storage distribution warehouses of the Kazakhstan S.S.R.
Khol.tekh. 40 no.5:4-7 S-O '63. (MIRA 16:11)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut kholodil'noy promyshlennosti.

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

GINDIN, I.S., tekhnik-tekhnolog; ANDREYEV, V.M., prof., otv.red.; POSTERNYAK, Ye.F., inzh., red.; FREGER, D.P., tekhn.red.

[Swivel carriage for cutting screw threads on turret lathes] Povorotnyi support dlia narezaniia rez'by na revol'vernykh stankakh. Leningrad, 1954. 5 p. (Informatsionno-tekhnicheskii listok, no.6(579)). (MIRA 14:6)

1. Leningradskiy Dom nauchno-tekhnicheskoy propagandy. 2. Leningradskiy Dom nauchno-tekhnicheskoy propagandy (for Posternyak). (Lathes--Attachments)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0

PROCESSES AND PROPERTIES INDEX

*Investigation of the Corrosion of Metals by Non-Electrolytes. I. The Action of Light Hydrocarbon Fuels on Metals and Alloys. L. G. Gindin and R. S. Ambarzumjan (*Izvestia Akademii Nauk S.S.S.R.* (*Bull. Acad. Sci. U.R.S.S.*), 1936, [vii], (10), 1385-1397).—[In Russian.] The action of petrol was investigated on aluminium (Si 0·23, Fe 0·32%), Duralumin (Cu 3·74, Si 0·2, Fe 0·43, Mg 0·94%), alloy No. 11 (Mg 3·18, Mn 1·0, Fe 0·20, Si 0·17%, remainder Al), American alloy (Cu 7·41, Si 0·08, Fe 0·27%, remainder Al), magnesium (traces Si; 0·12% Fe), zinc (Fe 0·10, Cu 0·00, Pb 1·0%), copper (traces of Bi and Sb), brass (38·88% Zn), bronze (10% Sn), carbon steel, and stainless steel. It may be assumed that aviation petrol does not affect the above metals and alloys, even after being saturated with water at 14° C.

S. A.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0

ca

7

Investigation of corrosion of metals by nonelectrolytes. II. Action of cracked benzines on zinc. L. G. Gindin, I. I. Toruev and R. S. Amiartzumyan. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat., Sér. chim.* **1936**, 73-88 (in German 88-91); cf. C. A. **30**, 3160[8]. The assumption that the aggressiveness of cracked benzines in causing corrosion of metals is due to their autoxidation is proven experimentally by subjecting weighed specimens of Zn plates to the action of Grozneny and Bakin cracked benzines for varying periods of time (up to 770 days). From the exptl. results it is established that the intensity of corrosion of Zn is a function of the acidity and amt. of tars present in the benzines. Under certain conditions, a "passive" film, probably composed of Zn and org. compds., forms on the Zn surface and protects it from further decompn. Eighteen references. John Livak

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0

CA 7

Autoxidation of unsaturated hydrocarbons. P. Panyutin, L. Hindin and O. Vasil'eva. *Compt. rend. acad. sci. U. R. S. S.* [N. S.], 2, 183-6(1936)(in German).—To 2.5 ml. of the substance to be tested, e. g., benzine, add exactly 25 ml. of 4% KI in EtOH and 0.5 ml. of pure, concd. H_2SO_4. Allow the mixt. to stand 4 hrs. in the dark in a stoppered bottle. At the same time start a blank expt. with the same quantities of reagents and 5 ml. of distd. benzine which is known to contain no unsatd. compds. After the specified time has elapsed, titrate the I_2 in the blank test with $Na_2S_2O_3$. In the main expt. titrate the excess KI after oxidation with ferric alum soln. To accomplish this, ext. the soln. in the main test with two 50-ml. portions of water. Dil. the aq. ext. to exactly 250 ml. and take a 50-ml. aliquot. Transfer this to a 200-ml. round-bottomed flask carrying a glass stopper which is fitted with a glass delivery tube. Add 5 ml. of 25% H_2SO_4, 2 g. of ferric alum and 2-3 pieces of calcite. Slowly heat the contents of the flask and pass the escaping gas into 100 ml. of 10% KI soln. which is kept cold with ice. Finally titrate the I_2 in the receiver with $Na_2S_2O_3$. In exactly the same way, treat 25 ml. of the KI soln. with ferric alum and det. the original I content. The peroxide no., expressed in g. I which would be used up by 100 g. of the substance analyzed, can be obtained by the formula, peroxide no. = $[a - 5(b - c) - e]T.100/n.d.$, where a = ml. $Na_2S_2O_3$ required for titrating the I_2 originally present in the KI soln., b = ml. $Na_2S_2O_3$ required in titrating the distd. I_2, c = ml. $Na_2S_2O_3$ required in the blank, T = titer of the $Na_2S_2O_3$ in terms of I, n = ml. of sample taken and d. its d. If it is desired to express the peroxide no. in terms of gram.-equiv. of active O, as is usual, then the titer of the soln. should be in terms of O. W. T. H.

ASM-SLA METALLURGICAL LITERATURE

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

B-I-4

Behaviour towards metals of solutions of sulphur and a range of organic sulphur compounds in saturated hydrocarbons. L. G. [illegible], I. I. [illegible], and V. A. KARAKOVA (Compt. rend. Acad. Sci. U.R.S.S., 1936, 3, 219—223; cf. B., 1936, [illegible]).—The rôle of S compounds in the corrosion of metals by fuel oils is discussed. Solutions of S in C_8H_{18} (free from S compounds) had no action on steel and Pb during 16 months at room temp., but formed CuS on Cu. R. C. M.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

PROCESSES AND PROPERTIES INDEX

M

*Corrosion of Metals by Light Hydrocarbon Fuels. L. G. Gindin and B. S. Ambarsumian (*Tekhika Vozdush. Flota* (*Tech. Air Fleet*), 1937, (4), 88–82). [In Russian.] Aviation petrols from Grozny and Baku petroleum have no action on aluminium, Duralumin, ZAGI-11 alloy, American alloy, magnesium, Elektron, zinc, copper, brass, or steel at 15–20° C., unless water is present as a separate layer, in which case considerable corrosion occurs, especially at the petrol–water interface. Since petrols obtained by the cracking process readily oxidize on exposure to the air, with the formation of tarry matter and organic acids, such petrols attack all the above metals strongly.
—N. A.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0

BC

A-1

Linear corrosion of metals. I. Selective corrosion of metals on three-phase boundaries. L. G. [illegible], D. [illegible], and V. M. [illegible] (J. Phys. Chem. Russ., 1937, 9, [illegible]).—The corrosion of Cu by aq. NH_3, of Zn by H_2SO_4, and of Mg by HCO_2H and AcOH occurs strongly on the three-phase boundary, metal-paraffin-corrosive liquid, causing the formation of deep rills around a paraffin spot on the metal surface. This linear corrosion is sometimes a periodic process. The linear corrosion on the phase boundary does not depend on surface activity of the corroding liquid and is not affected by addition of surface-active substances. E. R.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

"APPROVED FOR RELEASE: Thursday [illegible] CIA-RDP86-00513R000515110017-0"
APPROVED FOR RELEASE: Thursday [illegible] 0005[illegible]110017-0"

B-I-4

[illegible] alloys. III–V. Action of cracked petrol on (III) [illegible], and aluminium alloys, (IV) [illegible] and (V) copper and brass. [illegible] AMBARTSUMYAN. *J. Phys. Chem. Russ.*, 1937, 9, [illegible], [illegible]–[illegible], [illegible]–[illegible]; cf. B., 1938, [illegible]; 1939, 144).—III. The corrosion of Mg, Al, and Al alloys in [illegible] days by petrol made by cracking [illegible] has been investigated. Mg is strongly affected, but Al and its alloys are stable. The corrosion of Mg is due to autoxidation of the petrol.

IV. Cast-Fe (0·8% C) is strongly corroded by cracked petrol in [illegible]–[illegible] days at room temp. Corrosion is associated with autoxidation of the petrol. Stainless (Cr-Ni) steel remains unattacked after [illegible] days.

V. Cu is strongly corroded by cracked petrol in [illegible] days at room temp.; the losses in wt. are up to [illegible]. [illegible] is due to autoxidation of the petrol. [illegible] of corrosion occurs in presence of [illegible] (20 drops per litre). Brass is strongly corroded by petrol from Baku, but only slightly by [illegible]. The corrosion of brass is [illegible] with a [illegible]. R. R.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0

Corrosion of metals by nonelectrolytes. Influence of light hydrocarbon fuel on metals and alloys. IV. Action of cracked gasoline on steels. L. G. Gindin and R. S. Ambartsumyan. *J. Phys. Chem.* (U. S. S. R.) 9, [illegible] (1937); cf. C. A. **31**, 4258. C steel ([illegible]% C) is strongly corroded by cracked gasoline in 300–400 days at room temp. Corrosion is coupled with autoxidation of the gasoline. Stainless Cr-Ni steel remains unattacked after 400 days. **V. Action of cracked gasoline on copper and brass.** *Ibid.* 222–30. Cu is strongly corroded by cracked gasoline in 600 days at room temp.; the losses in wt. are up to 2.5 g. per 100 g. Corrosion is due to autoxidation of the gasoline. No autoxidation or corrosion occurs in presence of [illegible] pinene [illegible]. Brass is strongly corroded by gasoline from Baku, but only slightly by that from Grozny. The corrosion of brass is assocd. with a dezincification. R. C. A.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0

PROCESSES AND PROPERTIES INDEX

*Metal Corrosion by Non-Electrolytes. Influence of Light Hydrocarbon Fuels on Metals and Alloys. V.—Action of Cracked Petrols on Copper and Brass. L. G. Gindin, and R. S. Ambarzumian (*Zhur. Fizich. Khimii* (*J. Phys. Chem.*), 1937, 9, (2), 222–230). [In Russian.] Copper is strongly attacked by oxidised cracked petrol, and the action is controlled by the rate of autoxidation of the petrol and by the corrosion products. The actual loss in weight of the metal depends on the changes which occur in the composition of the oil; the results obtained with petrol derived from Baku oil differ from those obtained with petrol from Grozny oil. Both petrols attack β and α + β brass, producing dezincification.—N. A.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

Px

A-1

Linear corrosion of metals. Selective corrosion of iron by the system water–sulphuric acid–propyl alcohol on three-phase boundaries. L. Gindin and F. Sokhmalakin (Compt. rend. Acad. Sci. U.R.S.S., 1937, 16, 409—412; cf. A., 1937, I, 319).—The corrosion of Fe, partly covered with paraffin, in H_2O–H_2SO_4–Pr^aOH mixtures has been investigated. Concn. ranges which yield linear attack at the air–liquid and liquid–paraffin interfaces, periodic formation of films of corrosion product, and resinification of the Pr^aOH are distinguished. J. W. S.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

PROCESSES AND PROPERTIES INDEX

3C

17-1

Relation to metals of sulphur solutions and of a series of organic sulphur compounds in saturated hydrocarbons. Relations to iron of ethyl and butyl mercaptan solutions in *cyclo*hexane. L. G. Ginzburg, I. I. Torsujev, and V. A. Kazakova (Compt. rend. Acad. Sci. U.R.S.S., 1937, 16, 413—418).—Fe is unaffected by solutions of EtSH and BuSH in *cyclo*hexane. It is confirmed that the lamp method is satisfactory for determination of S in oils.

J. W. S.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0

PROCESSES AND PROPERTIES INDEX

Co

7

Research on autoxidation of unsaturated hydrocarbons. 1. Determination of peroxides in the presence of unsaturated compounds. P. S. Panyutin and L. G. Gindin. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat., Sér. chim.* 1938, 841-53(in English, 853-4).—The method depends upon treatment of the sample with 4% KI in alc. in the presence of H_2SO_4. The excess KI is extd. with water, oxidized by ferric alum soln. The liberated I_2 is absorbed in KI soln. and titrated with $Na_2S_2O_3$. The method is suitable for detg. peroxide in gasoline. Seventeen references. J. G. Tolpin

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 "CIA-RDP86-00513R000515110017-0"

CA 10

Oxidation of alkyl anthracenes, alkyl anthraquinones and their derivatives. I. Oxidation with chromic anhydride of β-methylanthraquinone to anthraquinone β-carboxylic acid. M. A. Il'inskii, [illegible] and V. A. Kazakova. *Compt. rend. acad. sci. U. R. S. S.* **20**, 555-8 (1938) (in English). A method of oxidation of β-methylanthraquinone (I), giving 96% of anthraquinone-β-carboxylic acid (II), has been developed by the following procedure. To 1 g. I in 50 ml. warm glacial AcOH was added gradually 3 g. finely ground anhyd. CrO_3 with vigorous stirring; the mixt. was warmed to 70° and held there for 8 hrs.; the contents were cooled, dild. with 400 ml. H_2O, and the ppt. filtered, washed with H_2O, boiled with dil. NH_3 soln. till the filtrate no longer gave a ppt. upon acidification; the soln. of the NH_4 salt of II was filtered and the filtrate acidified with HCl, giving II, m. 291-2°. The highest yields were obtained with anhyd. AcOH and CrO_3. **II. Oxidation of β-methylanthraquinone with chromic anhydride to anthraquinone-β-carboxylic acid as influenced by water.** *Ibid.* 559-60. Using the above oxidation conditions, the inhibiting action of H_2O was detd. The yield of anthraquinone-β-carboxylic acid was decreased with increase in the amt. of H_2O added. The results are tabulated. I. F. I.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0

Investigations of the corrosion of metals by nonelectrolytes. The action of light hydrocarbon fuel on metals and alloys. VI. The action of cracked gasoline on lead. L. G. Gindin. *Compt. rend. acad. sci. U. R. S. S.* 20, 561-4(1938)(in English); cf. C. A. 33, 2884[5]. When autoxidation occurs in Baku and Grozny cracked gasolines contg. metallic Pb, the Pb is strongly corroded. With the Baku material, 13.2 g. of Pb is attacked after 710 days in 100 cc. of the gasoline. Analysis shows that about 60% of the corrosion product is $PbCO_3$. It is suggested that org. acids formed on autoxidation first attack the Pb, then CO_2 displaces part of the org. acid in the Pb salt. George Ayres

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0

Ca 2

Kinetics of the polymerization of 2-chloro-1,3-butadiene catalyzed by benzoyl peroxide in dibutyl phthalate solutions. S. S. Medvedev, L. Gindin and M. Lazareva. *J. Phys. Chem.* (U. S. S. R.) 13, 1390-1402 (1939).—The kinetics of the polymerization of chloroprene (I) and the distribution of I in the gas and liquid phases were detd. by a manometric method. The soly. of I in dibutyl phthalate is given by $P/C^n = K$ with $n = 0.730$, $K = 2.15$ at 30°; $n = 0.822$, $K = 3.93$ at 60°. The polymerization process is heterogeneous; the rate increases with increasing concn. of I and benzoyl peroxide (II) only up to a certain max. and then remains const. This max. is greater the greater the surface available, varying from 2 to 8% II. With 4% II, the energy of activation between 30 and 60° is 12.5 Cal. On the basis of an analysis of the kinetic data, it is concluded that the initial active centers form as the result of reaction between I and ionized II radicals adsorbed on the walls. These reaction nuclei then leave the wall and the polymerization process takes place in the soln. vol. Deactivation may occur either by reaction with un-ionized II or by collision with adsorbed mols. of I. F. H. Rathmann

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

PROCESSES AND PROPERTIES INDEX

S

20

Corrosion of Metals by Non-Aqueous Solutions. The Action of Ethyl Alcohol on Metals. L. G. Gindin, R. S. Ambarzumian and E. P. Beichikova. (Comptes Rendus (Doklady) de l'Académie des Sciences de l'U.R.S.S., 1940, vol. 29, Oct. 10, pp. 44–47). This is the introductory paper to a projected series on the corrosion of metals in non-aqueous electrolytes, mainly alcohols and alcoholic solutions. The authors review the literature on the effect of ethyl alcohol on metals, and they describe the procedure they adopted for the purification of the ethyl alcohol used for their investigation. In the series of experiments described in the present paper, the tests were carried out in sealed glass tubes in an apparatus which is illustrated, and tables are given of the results obtained after keeping samples of magnesium, aluminium, zinc and steel (carbon 0·28%, manganese 0·51% and silicon 0·22%) for 210 days under absolute alcohol and for 150 days under 99·7% alcohol. Only magnesium proved to be slightly corroded by ethyl alcohol under the experimental conditions described, whereas the three other materials examined were not affected at all.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

20

Corrosion of Metals by Non-Aqueous Solutions. R. S. Ambarzumian, L. G. Gindin and E. P. Belchikova. (Comptes Rendus (Doklady) de l'Académie des Sciences de l'U.R.S.S., 1940, vol. 29, Oct. 20, pp. 91-94). The authors studied the influence of carbon dioxide on the action of ethyl alcohol on magnesium, aluminium and steel. They used alcohol saturated with carbon dioxide, and the experimental procedure was as described in the first paper of the series (see preceding abstract). They found that in the presence of carbon dioxide, steel and aluminium are also not corroded by ethyl alcohol, whereas the corrosion of magnesium is considerably enhanced.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

PROCESSES AND PROPERTIES INDEX

CA

Corrosion of metals by nonaqueous solutions I. G. Gudin, R. S. Ambartsumyan and E. P. Bel'chikova. *Compt. rend. acad. sci. U. R. S. S.* **29**, 208 (1940) (in English). The inactivity of EtOH on metals was examd. with respect to the possible presence of "autoinhibitors" such as aldehydes or fusel oils. Two metals Mg and Electron metal (I) were tested as described in previous expts. for a period of 130 days at 20 in 96.4% alc. free from aldehydes and fusel oil, and in the same alc. to which was added separately, 0.1% of formaldehyde, acetaldehyde, paraldehyde and benzaldehyde. The addn. of formaldehyde and acetaldehyde produced no inhibition. Paraldehyde inhibited completely the corrosion of Mg and greatly decreased that of I. Benzaldehyde decreased the corrosion of I by a factor of 3. Expt. showed, however, that in alc. with CO_2, none of the above aldehydes was effective in reducing the corrosion. I. K.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

PROCESSES AND PROPERTIES INDEX

31

The mechanism of the simultaneous polymerization of butadiene with vinyl cyanide and 1-methylvinyl cyanide under the action of benzoyl peroxide. L. Gindin, A. Abkin, and S. Medvedev (Karpov Inst. Phys. Chem., Moscow). *J. Phys. Chem.* (U.S.S.R.) 21, 1269-87 (1947)(in Russian).—Mixts. of butadiene (I) (x wt. %) with CH_2:CHCN (II) (100 − x %) or CH_2:CMeCN (III) (100 − x %) and $(BzO)_2$ (y%) were prepd. in N, heated t hrs., and distd. at room temp. in a high vacuum 20 hrs. The distn. residue (= polymer) was analyzed for N (i.e. nitrile) and active O (i.e. Bz_2O_2). For the detn. of active O the polymer must be dissolved in $CHCl_3$, not in acetone. The rate v of formation of polymer decreases when x increases; e.g. at 60° for the system I + II (y being 0.6%) the initial rate is 0.26% per hr. at x = 90% and 8.2% per hr. at x = 20%. During one expt. v is almost const. at small x and increases with time at large x. The v increases with temp.; e.g. 42% polymer is attained at 50° within 63 hrs. and at 70° within 11 hrs. The v is proportional to $\sqrt{y}$ between y = 0.3 and y = 10 wt.%. These results are discussed from the viewpoint of Abkin and Medvedev (C.A. 34, 7700[4]). The polymerization ceases when one of the components is used up. The highest yield of polymer (over 80%) is observed at x = 30% for the I + II and near x = 70% for the I + III system. The compn. of the polymer depends little on the time of polymerization and temp., but varies according to x. In the I + II system, the polymer contains more I than the original mixt. at x < 53% and less than the original mixt. at x > 53%. In the I + III system, the "azeotropic" mixt. has x = 60%. The concn. of $(BzO)_2$ in the polymer decreases when t increases. However, polymerization continues also after this concn. becomes zero. Monomer, distd. from the polymer and again mixed with it, polymerizes at the same v as if no distn. occurred, but soln. and repptn. of polymer remove its catalytic activity. The compn. of a copolymer depends on the consts. α and β expressing the relative rates of reaction of 2 free radicals with the 2 components of the monomeric mixt. A simple method for computing α and β from exptl. data is shown. From the values for α and β the distribution of monomer groups within the copolymer can be calcd. (cf. C.A. 42, 8046). In the copolymer I + II, 67% II is present as one nitrile group between 2 butadiene groups; and in I + III 80% III is in this alternate pattern. The cessation of polymerization when 1 of the components is used up shows that both components are needed for the branching of the reaction chain.

J. J. Bikerman

ASM SLA METALLURGICAL LITERATURE CLASSIFICATION

GINDIN, L. G.

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0

PA 35/49T67

USSR/Metals Dec 48
Copper
Corrosion

"Anthraquinone Protection of Copper From Corrosion by Sulfur Solutions," L. G. Gindin, R. Kh. Sil's, All-Union Inst Avn Materials, 4 pp

"Dok Ak Nauk SSSR" Vol LXIII, No 6

Shows that anthraquinone lengthens period of "incubation," which precedes beginning of corrosion, by 500,000 times. Table shows effect of anthraquinone on corrosion of copper by sulfur solutions. Decides that anthraquinone cannot properly be called an inhibitor, or its effect be called inhibition since it

35/49T67

USSR/Metals (Contd) Dec 48

does not slow the reaction but rather moves back its beginning, or "immunizes" the metal. Submitted by Acad A. N. Frumkin, 3 Nov 48.

[redacted] 35/49T67

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0
APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R000515110017-0"

Polymerization of allyl acrylate I Determination of the structure and molecular weight of the soluble forms of polyallyl acrylate. I. Gindin, S. Medvedev, and E. Fleshler *Zhur. Obshchei Khim.* (J. Gen. Chem.) 19, 1694-1701(1949). —Polymerization of allyl acrylate, b_{22} 119.5-21.5°, n_D^{20} 1.4330, d_4^{20} 0.888 (?), in 2.5 and 5.7% solns. in C_6H_6 with 1% Bz_2O_2 catalyst at 80° gives low mol. products, sol. in org. solvents, with the main chain linkage formed substantially from the "acrylic" double bond. The process, followed dilatometrically to 80% polymerization, gave 35.0%, total unsatn. of the product, which was almost identical with the "allyl" unsatn. (by the bromide-bromate method in CCl_4 AcOH), the total unsatn. was detd. by the bromide-bromate method in the presence of $HgSO_4$; the procedures were successfully tested on the monomer. G. M. Kosolapoff